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## *Agonopterix xeranthemella*, a new species of Depressariidae (Lepidoptera) from Europe and Turkey

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**Abstract:** *Agonopterix xeranthemella*, a new species of Depressariidae (Lepidoptera) from Europe and Turkey. *Misc. Pap.* 177: 1-9.

*Agonopterix xeranthemella* sp. n. is described. The new species is closely related to *A. laterella* ([DENIS & SCHIFFERMÜLLER], 1775). It is found in France, Republic of Macedonia, Greece and Turkey, and its larva is feeding on *Xeranthemum* sp. (Asteraceae). The moth and the genitalia of the new species and some of its related species are illustrated.

**Keywords:** Lepidoptera, Depressariidae, *Agonopterix*, Europe, Turkey, new species, DNA barcoding.

### Introduction

Among unset material in coll. ZMUC (Copenhagen), collected by M. Fibiger 1986 in Greece, and moths collected by K. Larsen 1998-2001 in Turkey, pinned but also unset, the author found specimens of an *Agonopterix* species resembling *A. laterella* ([DENIS & SCHIFFERMÜLLER], 1775), but markedly smaller. Dissection of one male showed genitalia distinctly different from any known *Agonopterix* species, nevertheless barcode confirmed it to be closely related to *A. laterella*. A description of this species had already been prepared, using the manuscript name "*A. paralaterella*" when in September 2018 in MNHN Paris two specimens were found, reared from *Xeranthemum* sp. and stored under the name "*Agonopterix xeranthemella* E. DATTIN i.l.", but a description had never been published. Dissection of one male showed its conspecificity with "*A. paralaterella*", providing information on the food-plant of the new species. DATTIN's proposed name has been adopted.

### Methods

**Morphological examination:** Genitalia preparations followed standard techniques (Robinson, 1976). Male preparations were stained with mercurochrome and females with chlorazol, which brings a better result than using the same stain for both sexes.

**Photographic documentation:** Photos of set specimens were taken with Canon EOS 5DMark III and Canon lens EF 100mm 2.8 L IS USM at 1:1. Photos of unset specimens and specimen details were taken with Canon lens MP-E 65 at 2:1, using ring flash. Genitalia photos were taken with microscope (Wild Heerbrugg) using a 10x objective and a 2.5x ocular. All photos were edited using the software Helicon Focus 4.80 and Adobe Photoshop 6.0.

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## Abbreviations

**DEEUR** “Depressariinae of Europe”, prefix for specimen-number of Depressariinae studied by P. Buchner

**MFN** Museum für Naturkunde, Berlin, Germany

**NHNV** Naturhistorisches Museum, Vienna, Austria

**MNHN** Muséum National d'histoire naturelle, Paris, France

**NMPC** Národní Muzeum Prague, Czech Republic

**RCKL** Research Collection Knud Larsen, Dyssegård, Denmark

**RCIR** Research Collection Ignác Richter, Malá Čausa, Slovakia

**ZMUC** Zoological Museum, University of Copenhagen, Denmark

**ZSM** Zoologische Staatssammlung München, Germany

## *Agonopterix xeranthemella* sp. nov.

<http://zoobank.org/NomenclaturalActs/C37840DE-E70B-4E77-8772-FFB857518248>

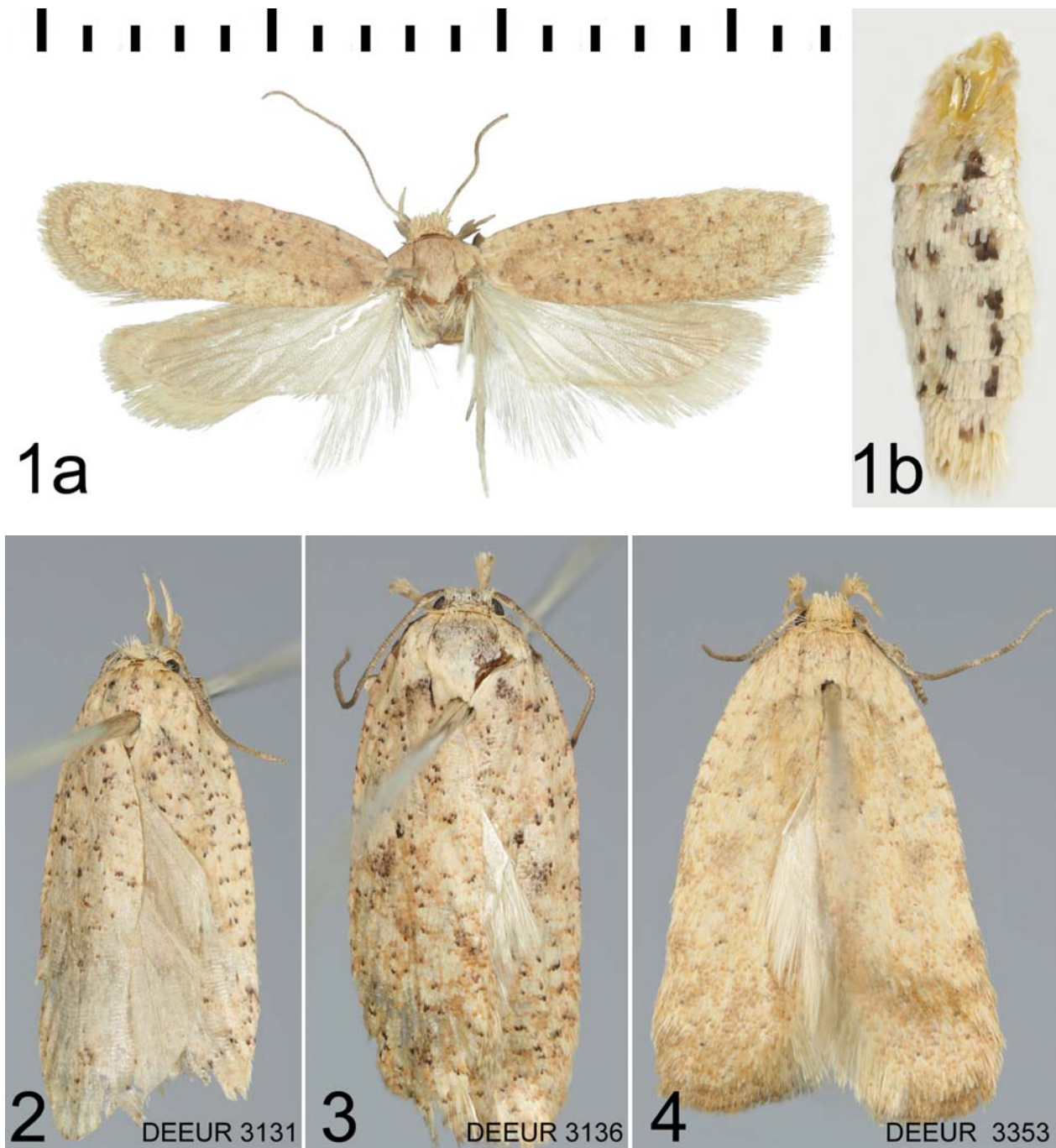
### Diagnosis

Externally the species is extremely similar to some forms of *A. laterella* (fig. 5), showing the same forewing pattern: an irregular mix of pale yellow, orange-yellow and interspersed black scales, poorly developed blackish central forewing dots and absence of white-centred forewing markings. Differences are the smaller size (16–18 mm wingspan, in *A. laterella* usually 20–22 mm) and the absence of a black ring in middle of third segment of labial palp (fig. 6). But to be sure, and to exclude also further similar species of this group, e.g. *A. carduella* (HÜBNER, [1817]), dissection is needed. In male genitalia, the shape of gnathos in ventral view (narrow triangular with straight lateral edges and blunt tip, figs 9–12) is unique in genus *Agonopterix*, and the shape of cuiller (thin and tapering to a very fine tip in distal half, figs 9–12) is also not found in exactly this form in any other European species, although it is very similar in *A. cuillerella* AMSEL, 1972 from Afghanistan. In female genitalia, the shape of papillae anales in ventral view differs from most *Agonopterix* species by nearly complete absence of medium length bristles but presence of a few very long bristles especially in basal half and many very short spinulae on whole surface, in combination with a triangular outline with broadest area near the base (not elliptic with broadest area near middle, as usual in *Agonopterix*). Papillae anales with this character are found in *A. laterella*, *A. carduella* and *A. cinerariae* WALSINGHAM, 1908 also, with differences in the shape of lower edge of sternite VIII, ostium and ductus bursae, for details see description of female genitalia and figs 16–20.

### Description

Imago (figs 1–4 & 6–7): Wingspan 15.5–18 mm. Scales of head pale yellow. Labial palp: second segment with pale yellow scales mixed with light brown scales on outer side, inner side pale; third segment predominantly pale yellow, mixed with a few brownish or blackish scales, not forming a black ring. Antenna medium brown. Thorax with posterior crest and usually with a tiny black spot on either side, but generally colour not contrasting against forewings, tegulae similar. Forewings with an irregular mix of pale yellow and light brown to orange-brown scales, black scales interspersed in low (but variable) numbers, basal field a little paler, sometimes nearly invisible, in forewing the border to basal field somewhat darkened, but this dark area not always developed. The centre of the forewing with the typical basic patterns of *Agonopterix* (two oblique dots at about 1/3, one dot at about 1/2 and a diffuse black spot between the two areas), but sometimes only poorly developed, or the black dots look like the irregular interspersed black scales and may be confused with them. White scales completely absent. Cilia pale yellowish in central part, with a markedly darker base and also darker subapically, these darker areas forming two distinct lines. Lower side of forewing uniformly medium brown except costa which is predominately pale yellowish with some interspersed groups of dark scales. Hindwing greyish, with a tendency to be more pale and translucent at base and becoming darker toward apex, a narrow dark line running along its margin, cilia more greyish than in forewings, but with same pattern of darker areas. Legs: femur and tibia rather dark grey on inner side, especially on fore- and midlegs, hindlegs predominantly yellowish, tibia with long yellowish scales. Abdomen pale yellowish, with two to four dark spots on each segment on ventral side (fig. 1b).

Variation: Within the 11 examined specimens some variation was found, especially the number of irregular interspersed black scales on forewings varies from nearly absent (as in both specimens from France) to rather prominent. Also the constant elements of central forewing pattern vary from nearly invisible to clearly visible.



**FIGURE 1:** *A. xeranthemella*, holotype 1a: general view, 1b: underside of abdomen, slightly turned to the left  
**FIGURES 2-4:** *A. xeranthemella*, paratypes, general view





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**FIGURE 5:** *A. laterella* (SW Turkey, Isparta Province, Sultan Dağları, 9.vii.2001), DEEUR 3135, leg. & coll. K. Larsen

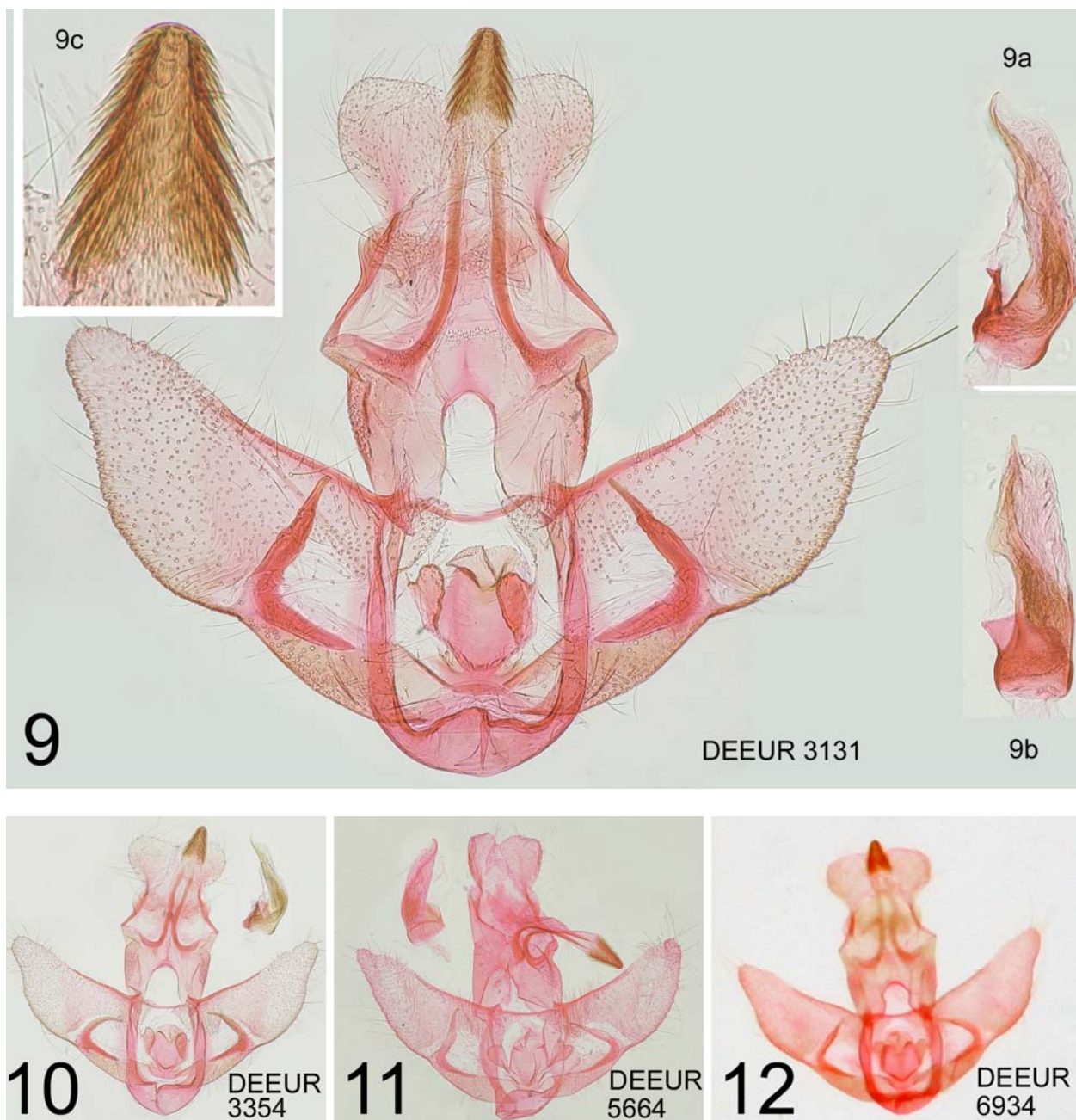


**FIGURES 6-7:** *A. xeranthemella*, labial palp  
**FIGURE 8:** *A. laterella*, labial palp, data as in fig. 5

### Male genitalia

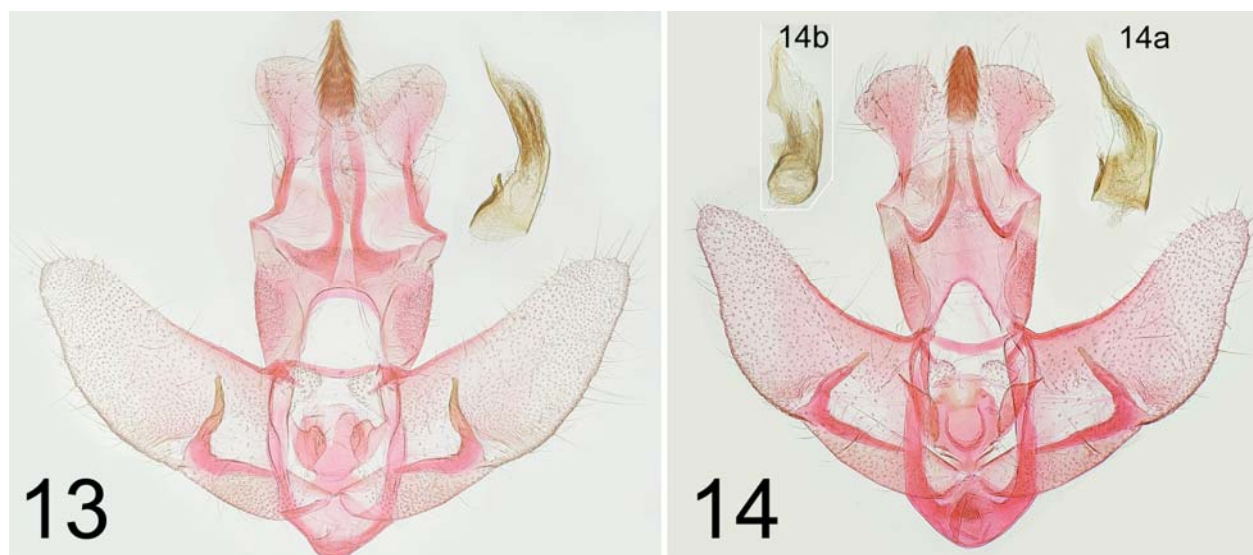
Best feature to distinguish from any other *Agonopterix* sp. is the shape of gnathos: narrow triangular with straight sides, including an angle of 30°, tip blunt, ratio length:width 1:1.3, its distal half overtopping socii in standard preparations (figs 9-12, enlarged in fig. 9c). The closest species, *A. laterella*, has a narrower gnathos with slightly concave sides (fig. 13). The second feature which is distinctive (but not unique) is the shape of cuiller: nearly straight or slightly curved, slightly swollen just below the middle and then tapering to a fine tip, just reaching costa of valva or ending before reaching it. *A. cuillerella* from Afghanistan shows this feature also, and among European species, this structure is most similar, but not identical in *A. subpropinquella* (STANTON, 1849) (fig. 14). Phallus comparatively broad (length:width ratio 4.5-5:1), tapering to a fine tip in lateral view (fig. 9a), in ventral view (fig. 9b) with a large bulge to the left just behind the middle and therefore strongly asymmetrical, a feature which is found in other species of this group of Asteraceae-feeding *Agonopterix*, e.g. *A. subpropinquella* (fig. 14b).

Remark: In standard preparation, cuiller tends to bend and turn more or less toward base of valva, sometimes even different in left and right cuiller, which gives the impression this structure is developed asymmetrically. But in fact genitalia are symmetrical and this effect is based on preparation artifacts.



**FIGURES 9-12:** *A. xeranthemella*, 4 specimens to show variability; inserts in fig. 9: phallus in lateral (9a) and ventral (9b) view, gnathos enlarged (9c)





**FIGURE 13:** *A. laterella*, Italy, Friuli, Interneppo, e.l. *Centaurea montana* 1960, coll. NHMV, gen.prep. DEEUR 0708 P. Buchner

**FIGURE 14:** *A. subpropinquella* (Spain, Cuenca, Albendea, 20.vii.1988), leg. M. Fibiger, coll. K. Larsen, gen.prep. DEEUR 2704 P. Buchner

### Female genitalia

The common shape of papillae anales in genus *Agonopterix* is elliptic, broadest near middle in ventral view, covered with many medium length bristles throughout, as an example *Agonopterix capreolella* (ZELLER, 1839) (fig. 20). In *A. xeranthemella* papillae anales differ sharply from this common form: medium length bristles nearly completely absent, but a few very long bristles present especially in basal half, whole surface densely covered with very short spinulae; outline in ventral view triangular with straight outer sides in caudal half, slightly swollen in craniad half, producing slightly concave margins near the middle, broadest at about 80 %, seen from caudal end, length:width ratio about 2:1. Only in *A. laterella* and *A. cinerariae* papillae anales are of this type. Differences are present in ductus bursae, which is swollen in the middle and showing intestine-like structures there in *A. laterella* (fig. 17, detailed in insert), while it is narrow throughout in *A. xeranthemella*; another difference is found in the shape of ostium: triangular structures at the connection of ductus bursae with ostium are medium sized with tips diverging at an angle of about 90° in *A. laterella*, but very broad with tips diverging at an angle of about 180° in *A. xeranthemella* (red arrow at left tip in figs 16a & 17a). Also different is number of turns of ductus spermatheca: about 5 in *A. laterella* and 2 in *A. xeranthemella* (red arrow in figs 16 & 17). The best distinguishing feature of *A. cinerariae* from *A. xeranthemella* is the shape of craniad edge of sternite VIII, which has only an indistinct excavation in the middle, but a distinct fold between ostium and this excavation, resembling a very flat “W” (red arrow in fig. 18a), while in *A. xeranthemella* this excavation is distinct, but no fold is developed there.

### Material

Specimens have been checked from the collection mentioned above, 11 specimens (8 males, 3 females) of *A. xeranthemella* sp.n. have been examined.

Holotype : ♀, Greece, Evros, 35 km N Alexandroupoli, 8.vii.1986, gen. prep. DEEUR 5485 P. Buchner, leg. M. Fibiger, coll. ZMUC.

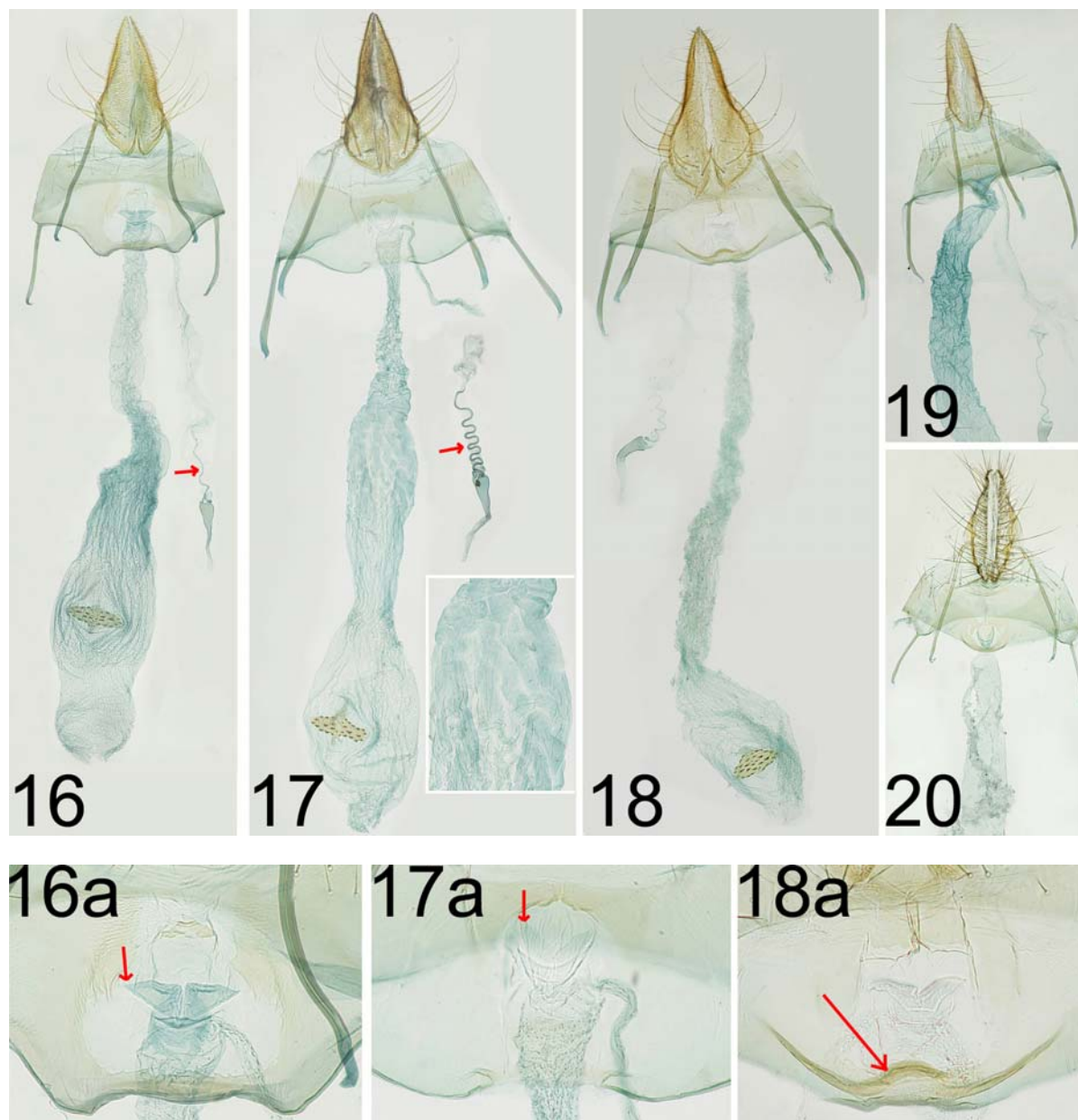
Paratypes: 1 ♂, France, Pyrénées Orientales, La Devèze, 15.vii.1928, e.l. *Xeranthemum*, gen. prep. DEEUR 6934 P. Buchner (= MNHN-EL préparation male no. 30), leg. & cult. E. Dattin, coll. MNHN EL62879.

1 ♂, France, Pyrénées Orientales, La Devèze, 14.vii.1930, e.l. *Xeranthemum*, leg. & cult. E. Dattin, DEEUR 6935, DNA barcode id BC-MNHN-LEP 00360, coll. MNHN EL62880.

1 ♂, Republic of Macedonia, Kavadarci, Drenovo, 10.iv.1959, gen. prep. 2141 H.J. Hannemann, DNA barcode id MFN29197-A03, DEEUR 5664, leg. F. Kasy, coll. MFN Berlin

1 ♀, Republic of Macedonia, Galicica, 25.vii.2015, gen. prep. DEEUR 7273 P. Buchner, DNA barcode id TLMF Lep 26019, leg. & coll. I. Richter.

- 1 ♂, 1 ♀, S Turkey, Adana Province, Saimbeyli, 1200m, 29.x.1998, leg. & coll. K. Larsen (♂: gen. prep. DEEUR 3254 P. Buchner; ♀: DNA barcode id. TLMF Lep 21991, gen. prep. DEEUR 3250 P. Buchner)
- 2 ♂, Turkey, Gümüşhane Province, Köseadağı geçidi, 1850m, 16.vii.2000, leg. & coll. K. Larsen (gen. prep. DEEUR 3553 & 3354 P. Buchner; DEEUR 3354 barcoded with DNA barcode id. TLMF Lep 19042)
- 2 ♂, SW Turkey, Isparta Province, Sultan Dağları, 9. 7. 2001, gen. prep. DEEUR 3131 & 3136 P. Buchner, leg. & coll. K.Larsen



Female genitalia, general view (16-20) and ostium region enlarged (16a, 17a, 18a)

**FIGURE 16:** *A. xeranthemella* holotype

**FIGURE 17:** *A. laterella*, insert: swelling of ductus bursae enlarged (Austria, Leopoldsberg, 28.vii.1915, coll. NHMV, gen.prep. DEEUR 0088 P. Buchner)

**FIGURE 18:** *A. cinerariae* (Canary Islands, Tenerifa, 15.iv.1965, leg. J. Klimesch, coll. ZSM, gen. prep. DEEUR 0878 P. Buchner)

**FIGURE 19:** *A. carduella* (Austria, Perchtoldsdorf, 30.iv.2016, leg. & coll. O. Rist, gen. prep. DEEUR 4980 P. Buchner)

**FIGURE 20:** *A. capreolella* (Turkey, Gümüşhane Province, Köseadağı geçidi, 1850m, 16.vii.2000, leg. & coll. K. Larsen, gen. prep. DEEUR 3358 P. Buchner)

**Genetic data****Barcodes under**

TLMF Lep 21991 (658 bp., ♀, S Turkey, Adana Province, Saimbeyli, 1200m, 37,98° N; 39,08° E; 29.x.1998, leg. & coll. K. Larsen, gen. prep. DEEUR 3250 P. Buchner)  
 TLMF Lep 19042 (658 bp., ♂, Turkey, Gümüşhane Province, Köseadağı geçidi, 1850m, 40,30° N; 39,60° E 16.vii.2000, leg. & coll. K. Larsen, gen. prep. 3354 P. Buchner)  
 4 further samples had been submitted for sequencing, but results not yet available until 5.xii.2018:

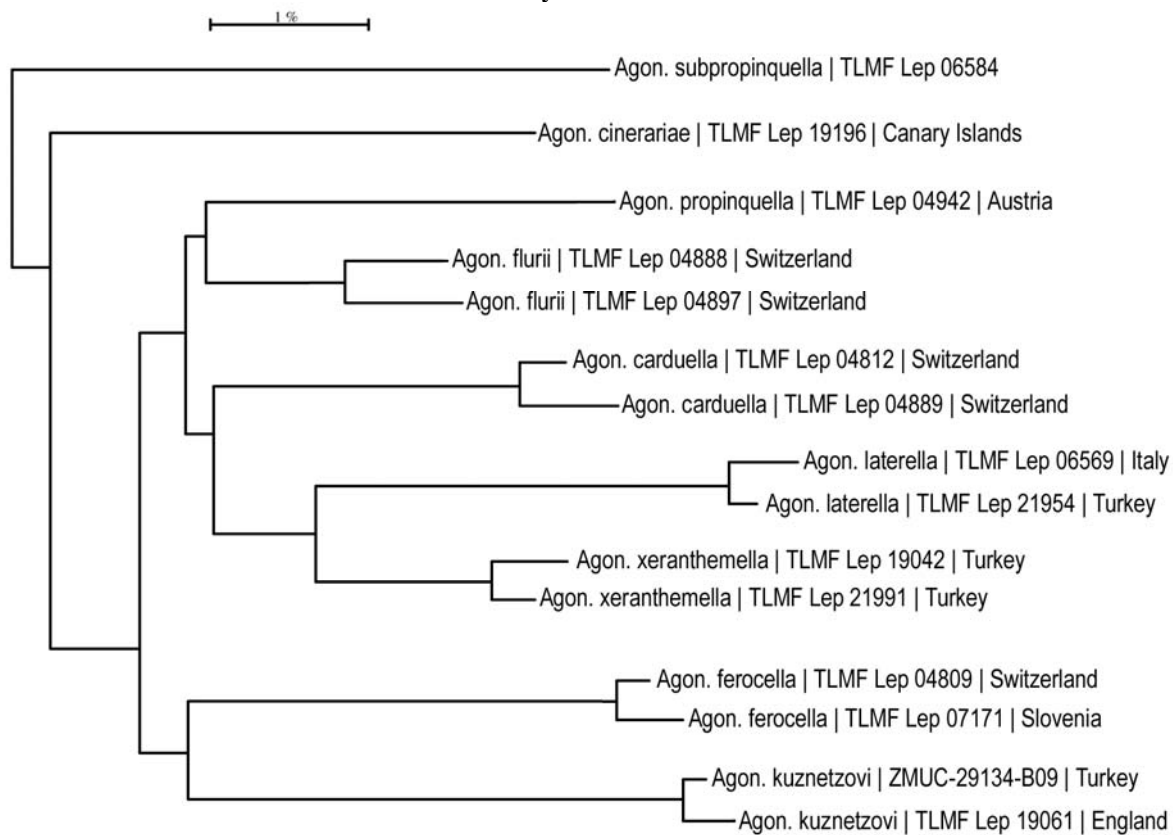
DEEUR 5485: DNA barcode id TLMF Lep 26017

DEEUR 5664: DNA barcode id MFN29197-A03

DEEUR 6935: DNA barcode id BC-MNHN-LEP 00360

DEEUR 7273: DNA barcode id TLMF Lep 26019

Barcode data are accessible via the public dataset DS-DEEUR352. Samples not yet sequenced will be added to this dataset as soon as they are available.



**FIGURE 21:** Neighbour-joining tree of *Agonopterix xeranthemella* and its closest clusters.

Associated BOLD BINs:

*A. subpropinquella*: BOLD:AAZ9000

*A. cinerariae*: BOLD:ADF1547

*A. propinquella*: BOLD:AAE7185

*A. flurii*: BOLD:ABA0550, BOLD:ACE4660

*A. carduella*: BOLD:AAM8921

*A. laterella*: BOLD:AAV9910

*A. xeranthemella*: BOLD:ADB7794

*A. ferocella*: BOLD:ABA0924

*A. kuznetzovi*: BOLD:ACZ3611



### Related species

Neighbour-joining analysis of the DNA barcodes show *Agonopterix flurii* as the nearest neighbour with 3.59% p-distance and *A. laterella* as second nearest neighbour with 4.06% p-distance. A look at the neighbour-joining tree shows, *A. flurii* has the shortest horizontal branch, therefore it tends to be the nearest neighbour of other species also (in this selection these are *A. carduella* and *A. ferocella*). The location of the nodes gives a better information about relatedness, and in combination with genitalia features *A. laterella* is the first choice for the closest related species.

### Distribution

So far known from France, Republic of Macedonia, Greece and Turkey.

### Biology

According to label data E. Dattin reared the new species from larvae collected on *Xeranthemum* sp. (Asteraceae) from Pyrénées Orientales, France. Moth emerged in middle of July, and a worn specimen had been caught in April, indicating that the species hibernates as adults.

### Derivation of name

The name was derived from the genus name of the only known food-plant, *Xeranthemum* sp.

### Acknowledgements

I am most grateful to Dr Wolfram Mey (MFN, Berlin), Prof Joël Minet (MNHN, Paris), Dr Martin Lödl and Dr Sabine Gaal-Haszler (NHMV, Vienna), Dr Andreas Segerer (ZMS, Munich), Mr Ole Karsholt (ZMUC, Copenhagen) and the private collectors Knud Larsen (Denmark) and Ignác Richter (Slovakia) for the loan of specimens, Ole Karsholt for detailed comments and corrections on the manuscript, Ing. Jan Šumpich for additional comments, to the Canadian Centre for DNA Barcoding (Guelph, Canada), whose sequencing work was enabled by funding from the Government of Canada to Genome Canada through the Ontario Genomics Institute, Martin Corley for linguistic corrections and Prof Dr Ahmet Ö. Koçak for the offer to publish in this paper.

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